

WHAT IS CLAIMED IS:

1.A disk controller, wherein:

in a disk subsystem provided with plural disk
5 controllers, a communication means between the disk
controllers, disk drives and each disk interface
between the disk controller and the disk drive, the
disk controller is provided with a cache memory and a
control memory that stores the control information of
10 the cache memory; and

the cache memory provided to one disk controller
that receives an access request from a host computer
can access and store data for the disk drive connected
to the disk controller provided with the cache memory
15 via the disk interface and in addition, data for the
disk drive connected to another at least one disk
controller via the disk interface via the communication
means.

20 2.A disk controller according to Claim 1, wherein:

for control information stored in the control
memory, a cache directory for specifying a disk
controller that stores data at the destination of
access in its cache memory and a cache address for
25 storing data at the destination of access every unit of
access are stored every unit of access uniquely
determined based upon a disk controller number and a
disk drive address.

3.A method of controlling a cache memory of a disk controller, wherein:

5 in a disk subsystem provided with plural disk controllers, a communication means between the disk controllers, disk drives and each disk interface between the disk controller and the disk drive, the disk controller is provided with each cache memory;

10 the disk controller that receives an access request from a host computer processes the access request after the exclusive operation of access data and reports the completion to the host; and

15 afterward, in case access from the host computer is a request for update access and the disk controller except the disk controller that receives the access stores the access data in its cache memory, the exclusion of the data is released after coherence control.

20 4.A method of controlling a cache memory of a disk controller according to Claim 3, wherein:

a disk controller that receives a request for update access from a host computer stores update data received from the host via a communication means

25 between the disk controllers in a cache memory of the disk controller connected to the disk drive via a disk interface in case the destination of the update access is a drive connected to another disk controller except

the disk controller via the disk interface.

5.A method of controlling a cache memory of a disk controller according to Claim 4, wherein:

5 a disk controller that receives a request for read access from a host computer determines whether access data is stored in a cache memory in the disk controller that receives the request for access or not by referring to a cache directory according to Claim 2 of the disk controller connected to a disk drive at the destination of access via a disk interface;

10 in case the data is stored, the data is transferred to the host computer, referring to the cache memory at once;

15 in case the data is not stored in the cache, it is determined referring to the cache directory whether access data is stored in a cache memory of a disk controller connected to a disk drive at the destination of access via a disk interface or not;

20 in case the data is stored, the data is transferred to the cache memory in the disk controller that receives the access request and the host computer once, referring to the cache memory; and

25 in the meantime, in case the data is not stored in the cache, the data is transferred from the disk drive at the destination of access to the cache memory of the disk controller connected to the disk drive at the destination of access via the disk interface, the cache

memory in the disk controller that receives the access request and the host computer.

6. A method of controlling a cache memory of a disk controller according to any of Claims 3-~~to~~5, wherein:
- 5 update data stored in a cache memory is stored in a drive connected to a disk controller via a disk interface; and
- further, the update data in a cache memory storing
- 10 the update data in a disk subsystem of another disk controller is invalidated.

7. A method of controlling a cache memory of a disk controller, wherein:
- 15 in a disk subsystem provided with plural disk controllers, a communication means between disk controllers, disk drives, each disk interface between the disk controller and the disk drive, each disk controller is provided with a cache memory;
- 20 the cache memory stores only data of the disk drive connected to the disk controller via the disk interface;
- in case an access request from a host computer is read access, data is transferred from a cache memory of
- 25 a disk controller connected to a disk drive at the destination of the request or the disk drive to the host computer; or
- in case an access request from a host computer is

update access, data is transferred to a cache memory of a disk controller connected to a disk drive at the destination of the request via a disk interface.

5 8.A method of controlling a cache memory of a disk controller according to any of Claims 3-~~to~~7, wherein:

an area of a cache memory is divided into an area in which data for a disk drive connected to a disk controller that receives access via a disk interface is stored and an area in which data for a disk drive connected to another disk controller in a subsystem via a disk interface is stored and is managed.

10 9.A method of controlling a cache memory of a disk controller according to any of Claims 3-~~to~~8, wherein:

data for a drive connected to a disk controller that receives access from a host computer via a disk interface is stored with the data doubled or multiplexed in a cache memory; and

20 in the meantime, data for a drive connected to another disk controller in a subsystem via a disk interface is stored without being multiplexed in a cache memory.

25 10.A method of controlling a disk controller, wherein:

in a disk subsystem provided with plural disk controllers, a communication means between disk

controllers, disk drives and each disk interface between the disk controller and the disk drive, each disk controller is provided with a cache memory; and

in a method of controlling a cache memory in which the cache memory can also store data of a disk drive connected to another disk controller in the subsystem via a disk interface, in case a trouble occurs in a certain disk controller in the subsystem, data of a disk drive connected to the disk controller where the trouble occurs via a disk interface, which is stored in a cache memory of a normal disk controller, is invalidated.

11.A disk controller according to Claims 1 and 2, wherein:

a cache memory with which a disk controller is provided is composed of a nonvolatile cache memory storing data for a drive connected to a disk controller that receives access via a disk interface and a volatile cache memory storing data for a drive connected to another disk controller in a subsystem via a disk interface.

12.A disk controller according to any of Claims 1, wherein:

a communication means between disk controllers is a connection acquired by expanding an interconnection in the disk controller.

13.A disk controller according to any of Claims 1,
wherein:

in a disk subsystem provided with plural disk
5 controllers, a communication means between disk
controllers, disk drives and each disk interface
between the disk controller and the disk drive, the
disk drive is provided with a logical disk inside; and
the disk controller stores the access frequency
10 information of a channel, the disk controller and the
logical disk as the control information of a cache
memory provided in the disk controller.

14.A method of controlling a disk controller
15 according to Claim 13, wherein:

it is determined whether a channel the access
frequency of which is the highest of channels that
receive access to a logical disk and the logical disk
at the destination of access are connected to the same
20 disk controller via a disk interface or not;

in case they are not connected to the same disk
controller, the logical disk is relocated in a drive
connected to a disk controller to which a channel the
access frequency of which is the highest is connected
25 via disk interface; and

in case they are connected to the same disk
controller, a host computer that accesses to the
logical disk and uses another channel uses a channel of

a disk controller connected to a disk drive provided with the logical disk via a disk interface.

15.A method of controlling a cache memory of a
5 disk controller according to any of Claims 7, wherein:
an area of a cache memory is divided into an area
in which data for a disk drive connected to a disk
controller that receives access via a disk interface is
stored and an area in which data for a disk drive
10 connected to another disk controller in a subsystem via
a disk interface is stored and is managed.

16.A method of controlling a cache memory of a
disk controller according to any of Claims 8, wherein:
15 data for a drive connected to a disk controller
that receives access from a host computer via a disk
interface is stored with the data doubled or
multiplexed in a cache memory; and
in the meantime, data for a drive connected to
20 another disk controller in a subsystem via a disk
interface is stored without being multiplexed in a
cache memory.